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Recent Trends in the Use of Antibiotics*

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Introduction

SINCE antibiotics became available for use in veterinary medicine, the practising veterinary surgeon has had at his command powerful agents for the treatment of conditions that had frequently been intractable to earlier forms of therapy. A vast amount of work has been done in the search for new antibiotics, and the number on the market continues to increase, with the inevitable temptation to use the latest, which frequently appears the most spectacular in its claims. It is important to realise, however, that only time, clinical use and extensive experiments can prove the real therapeutic values of these substances.

There has been perhaps a tendency to use antibiotics solely on clinical grounds, without sufficient regard for some of the essential requirements of sound chemotherapy. Recently, however, clinicians have been paying more attention to the general properties of antibiotics, and in dealing with this subject it may be appropriate

(1) to consider briefly the underlying principles of chemotherapy with antibiotics;
(2) to enumerate the available antibiotics for clinical use;
(3) to consider the uses of antibiotics in major diseases.

Chemotherapy

Keele (1953), enumerated several principles of importance in the application of chemotherapy.

The Aim

There should be only one aim in chemotherapy, *i.e.* " to choose the appropriate drug for the purpose and to administer it in such a way, and for such a time, as is necessary to bring about the desired result, without producing unwanted side effects," whether toxicity or drug resistance, and without unnecessarily high cost.

Selection of Appropriate Drug

In selecting a drug the guiding principle is " selective toxicity " *i.e.* the choice of a drug maximally harmful to the causal organism and minimally harmful to the host. This is Ehrlich's fundamental principle and applies to any drug. Compounds effective *in vitro* are useless in practice if they are toxic to the subject.

*Presented to a meeting of the Western Counties Veterinary Association, January, 1954.

Selection of drugs for different stages of disease: early acute infections are generally more amenable to treatment than chronic forms. This is especially true in antibiotic therapy; in secondary or chronic stages of disease, antibiotic therapy may be unsuccessful owing either to (1) irreversible tissue changes that make the causal organisms or lesions less accessible or (2) development of resistance to the antibiotic by the causal organism.

It is accepted that an antibiotic should only be prescribed when there is a clear indication for its use, and when the causal organisms are known or believed to be susceptible to it. In veterinary medicine facilities for laboratory diagnosis are not always available, and veterinary surgeons sometimes have to base treatment solely on their clinical experience. Publication of clinical and research results with antibiotics are of the utmost value, as it spreads information about their general properties, about organisms susceptible to them and about general indications for their use. Such information when correlated must be of help to the clinician, who has often little time or opportunity to follow the rapid and ever changing developments in chemotherapy.

Care must be exercised not only in the choice of antibiotic and dosage, but also in the method of administration, since this may affect its future use in the same animal. Drug resistance to one antibiotic may be overcome by the use of another.

Combined Action of Antibiotics

In certain diseases antibiotics may be used not only singly, but also in combination, or along with other drugs, such as sulphonamides. The pairing of antibiotics may produce the following effect on bacteria—indifference, potentiation, or antagonism.

Potentiation (sometimes loosely called synergism) occurs when certain substances, *e.g.* bactericidal agents, are used together and give better results than the simple sum of their separate effects. Such combinations of substances may be recommended:—

(1) to treat chronic diseases;
(2) to prevent resistance to a particular antibiotic;
(3) to make use of one antibiotic not effective by itself, yet showing marked therapeutic effect in conjunction with another substance (*e.g.* penicillin with streptomycin or sulphonamides).

Antagonism is defined (Jawetz, 1953) "as a marked decrease in the early bactericidal rate *in vitro*, as compared with that of the more active single drug alone, and a reduction in the rate of cure of infections below that observed with the single more active drug."

The following table illustrates the effect of some combinations of antibiotics:—

One way of avoiding development of resistance to penicillin is by using it with streptomycin or sulphonamides.

Penicillin is used with streptomycin:

(1) to deal with mixed infections;

TABLE I
COMBINING ANTIBIOTICS

1.	Bactericidal antibiotics	Penicillin Streptomycin	Frequently synergistic, occasionally additive, never antagonistic
2.	Bacteriostatic antibiotics	Aureomycin Chloramphenicol Terramycin	Always additive

Group 1 with Group 2 may be antagonistic (Jawetz & Gunnison, 1952)

(2) to deal with organisms partly (but not completely) resistant to either antibiotic alone;
(3) to delay development of resistance to either antibiotic.

There are several diseases in which such combinations of these substances are of great value.

Administration and Dosage

Since the drug must gain access to the site of infection, the route of administration must be considered in relation to the drug's absorption and distribution, whether it be from the site of injection, from the alimentary tract or by local application.

Absorption of Antibiotics

From sites of injections that may be intravenous, subcutaneous, intramuscular or, in special circumstances, intrathecal. The method of injection must be governed by the nature of the disease, the ease of administration and the species of animal.

Via the alimentary tract—there is a difference in the alimentary absorption of different antibiotics; for example, it has been found that, given orally:

(a) chloramphenicol, aureomycin (chlortetracycline) and terramycin (oxytetracycline) are well absorbed;
(b) penicillin is absorbed somewhat irregularly;
(c) streptomycin absorption is limited;
(d) bacitracin is not absorbed, being destroyed in the gastro-intestinal tract.

Distribution of Antibiotics in the Body

Blood levels and tissue levels must both be considered. In treating localised conditions topical application of the drug can gain ready access to the infection and is to be recommended.

In the early days of antibiotics, it was believed, particularly of penicillin, that the therapeutic effect depended on the maintenance of a bacteriostatic level in the bloodstream, and from that time much stress has been laid on the importance of "blood levels." Later it was found (Bigger, 1944) that the amount of penicillin demonstrable in the blood might be insufficient to explain the therapeutic effect achieved. This finding led to the investigation of the behaviour of penicillin in the tissues, and it now appears that tissue levels are of more clinical significance than blood levels. That the relationship between blood and tissue levels is of great importance can be seen from the following table:—

TABLE II
BLOOD AND TISSUE LEVELS. INTER-RELATIONSHIP

30,000 units (intramuscular)	Duration of detectable blood level: Blood	Exudate from necrotic focus
Sodium penicillin ...	3 hours	8 to 9 hours
Procaine „ ...	24 „	31 hours

(Ungar, 1950)

Some consideration has to be given to the types and frequency of penicillin administration and its relation to tissues affected by disease. On this matter the observations of Florey *et al.* (1946) are important; they showed that penicillin injected after severe tissue damage can be detected in the wound for longer periods than in the blood. This was also found by Ungar (1950), who produced blisters and artificial oedema in rabbits by injecting small amounts of turpentine into the muscles of the hind leg. Subsequent administration of penicillin to these rabbits resulted in the presence of the antibiotic in the blister exudates, and it was found that a single injection of the antibiotic gave levels that were maintained longer in the oedematous tissue exudates than in the blood, the degree of persistence depending on the penicillin salt employed (see Table II).

These results may be summarised:—

The penicillin remains in damaged tissues longer than in the blood; the antibiotic is more selective for *damaged* than for normal tissue. The duration may be twice as long in the damaged tissues as in the blood, and antibacterial levels may be maintained in the affected tissues for some hours after the disappearance of penicillin from the blood. This selective accumulation in the inflamed area is one of the most important reasons for the therapeutic effect of single massive doses of penicillin.

The duration of a single dose of penicillin must also be considered and is illustrated in the following table.

TABLE III
BLOOD LEVELS. DURATION FROM DIFFERENT DOSES OF SODIUM PENICILLIN

Dose by intramuscular injection	Duration of detectable blood level
15,000 units	2½ to 3 hours
30,000 „	3 „
50,000 „	4 „
100,000 „	5 to 6 „
250,000 „	7 to 8 „
500,000 „	9 to 10 „
1,000,000 „	12 „

(Fleming, 1950)

The fact that penicillin has a predilection for damaged sites affects decisions about its administration.

Penicillin—Types and Frequency of Administration

The general view that penicillin is still the most useful antibiotic is based on the belief

(1) that it is effective against the most frequently occurring infective organisms;
(2) that it is practically non-toxic to the subject;
(3) that it is economical.

We can appreciate these advantages more fully if we consider how penicillin exerts its effect.

Penicillin when injected into the bloodstream can either kill the infective organisms or inhibit their growth and allow the body mechanism to do the rest; in other words, it may be bactericidal or bacteriostatic.

It is now accepted that bacteria are killed during the process of multiplication when exposed to the bactericidal action of penicillin; if they are exposed to lesser (*i.e.* bacteriostatic) concentrations, organisms are capable of entering into a resting phase in which they are more resistant to the action of the antibiotic. In this non-multiplying phase the bacteria may die off; alternatively, when the antibiotic has disappeared they may have again become susceptible to the action of penicillin at higher (*i.e.* bactericidal) concentrations. It is essential, therefore, in order to achieve the maximum effect of penicillin for it to be administered in such a form and in such a way that it can attack the causal organism during the process of multiplication.

The effectiveness of the treatment will also depend on the rate at which the drug can be released into the bloodstream, and the sensitivity of the causal organism to it.

Bigger (1944) showed that intermittent large doses were more effective than frequent small ones, and Tillet *et al.* (1945) showed that laboratory animals treated once or twice daily with large doses of penicillin were able to resist streptococcal and pneumococcal infections as well as animals given the same quantities over the same period of 24 hours, but administered in several injections.

Several other workers, notably Jawetz (1946), White *et al.* (1946), and Zubrod (1947), have shown that the survival of experimentally treated animals depended more on the total dose of penicillin injected than on the intervals between administrations, and it is now customary to inject large doses of penicillin at 12 to 24 hourly intervals.

Several workers have published results of clinical experience showing that many infections can be adequately controlled with long penicillin-free intervals; amongst these are Tillet *et al.* (1945), Tumulty & Zubrod (1948), Price (1948), Hamburger *et al.* (1949), Altemeier (1948), Wheatley (1947), Tompsett *et al.* (1949), Weiss & Steinberg (1949), and Southworth & Dobbs (1949).

Clinically it is also accepted that there is need for prolonged and continuous treatment to eradicate established deep-seated foci of infection.

From a consideration of the observations on the absorption of penicillin, on its levels in blood and tissues and on its rapid renal excretion, it can be understood why to-day the most widely recommended form of penicillin should be an aqueous solution of the crystalline sodium salt.

Under conditions due to organisms highly sensitive to penicillin the urgency of treatment is less pronounced. Under such conditions and when ease of administration is important, adequate protection can be achieved by the use of a relatively insoluble salt of penicillin, *e.g.* procaine penicillin.

Development of Penicillin

During the last five years or so, penicillin has been presented in a variety of forms, and it may be well to mention the prolonging agents that have been used in combination with it.

A. Salts of penicillin that disintegrate slowly :—

(1) Procaine;

(2) Benzathine (benzethacil);

(3) Benethamine (" Benapen ").

The effect of procaine penicillin after intramuscular injection is too well-known to need discussion here. That of benzathine and benethamine penicillins is to produce prolonged (up to 15 days has been claimed for the former salt) but low levels of antibiotic in the blood (Glenny, 1952). These salts may be of use in mild infections or when the infecting organisms are markedly sensitive to penicillin.

B. Agents that compete with penicillin for elimination by the kidneys :—

(1) P-aminohippuric acid;

(2) Diodone (diethanolamine salt of 3:5-diiodo-4-pyridone-N-acetic acid);

(3) Carinamide (4 carboxyphenylmethane sulphonanilide);

(4) Probenecid (p-(di-n-propylsulphamyl)-benzoic acid).

Agents 1 and 2 must be administered continuously if they are to inhibit the excretion of appreciable amounts of penicillin. If 3 and 4 are given at intervals of several hours, they maintain their effectiveness by hindering tubular excretion of the antibiotic, and this, according to Sheidy (1953), does not " seriously interfere with kidney function." Such claims call for a prolonged trial in the field. In canines a large proportion of males eventually are affected with nephritis, in these circumstances more extensive work should be carried out before such a form of therapy can be generally recommended.

The Oral Use of Penicillin

Penicillin can be administered orally; it is only so administered to canines and felines, and even then its use might present several disadvantages. The absorption of oral penicillin is not uniform and may vary from day to day; sometimes the subsequent blood concentration may not reach sufficient levels and the necessary dose may be from 3 to 10 times that of an intramuscular dose.

In the use of antibiotics generally, several other factors must be considered: these are: —

(1) *Toxic effects*—individual consideration must be given to each antibiotic employed.

(2) *Drug allergy*—this is extremely rare in animals.

(3) *Effect on bacterial gut flora*—this must be considered carefully—whether the administration is by oral or parenteral route.

It is important to avoid indiscriminate destruction of commensal alimentary organisms; this may lead to an unusual predominance of insensitive strains of *Escherichia coli*, and may itself produce a disease entity (the problem has become of some importance for human medicine in U.S.A.).

From above it will be seen that the clinician accepts a good deal of responsibility when using such selective and powerful substances as antibiotics.

Antibiotics of Clinical Importance

(Not all available in this country.)

1. Penicillin.
2. Streptomycin and dihydrostreptomycin.
3. Aureomycin.* } broad spectrum
4. Chloramphenicol. } antibiotics.
5. Terramycin.* } broad spectrum
6. Tetracycline.
7. Bacitracin.
8. Neomycin.
9. Polymixin.
10. Tyrothricin.
11. Erythromycin.
12. Carbomycin.

Of this considerable list the chief antibiotics in veterinary practice are penicillin, streptomycin and chloramphenicol.

Broad Spectrum Antibiotics

Chlortetracycline (aureomycin).
Chloramphenicol.
Oxytetracycline (terramycin).

These substances have, besides their antibacterial action, some activity against viruses and rickettsia; from the clinical aspect it must be recognised that they have not been found active against any viruses of major importance in everyday practice, such as canine distemper or contagious canine hepatitis. Their use in penicillin resistant staphylococcal infections may be of value, always provided that we are dealing with a true " resistance " and not a visual impression or an assumption or, as in certain cases of apparent resistant mastitis, where there may be in fact a mechanical obstruction preventing the antibiotic reaching the site of infection, such as blocking of the lacteals by pus.

There are, and always have been a number of strains of staphylococcus that resist penicillin treatment because they can produce " penicillinase " before the penicillin has a chance to exert its effect. This is not acquired resistance, and strains that do not have this ability to produce penicillinase are, with rare exceptions, capable of being affected by penicillin. The whole question of organisms acquiring resistance must, in fact, be treated with reserve, as in this country, in veterinary medicine, there have been no clinical reports of acquired resistance to penicillin treatment.

**Tetracyclines.* Aureomycin is chlortetracycline. Terramycin is oxytetracycline.

Generally speaking, the broad spectrum antibiotics should be reserved for special uses and not be employed unless there are clear pointers to their efficacy.

Use of Antibiotics in Various Major Diseases

The use of tyrothricin, discovered by Dubos in 1930, for treating bovine mastitis (Little, Dubos, & Hotchkiss, 1941) introduced antibiotics into veterinary medicine. At first they were used mainly for the treatment of certain diseases of economic importance—such as bovine mastitis—this disease has been recognised for over 139 years and has had a variety of treatments. It is generally accepted that mastitis due to *Streptococcus agalactiae* can be successfully treated with penicillin, Edwards (1954), Hughes *et al.* (1950), Murnane (1949), Stableforth (1950), and Wilson (1952). About 90 per cent. of cases are cured. Sometimes clearance of symptoms can be achieved in over 95 per cent. of cases treated.

Attention has now been drawn to other causes of the disease, such as staphylococci and gram-negative organisms, insensitive to penicillin treatment. These infections are becoming much more frequent, and for treating them broad spectrum antibiotics are being used, particularly in America. There is some suggestion that their action may only be bacteriostatic and occasionally irritation of the udder may result. In mixed infections or those due to gram-negative organisms it has been found that the "synergistic" action of penicillin and streptomycin gives the mixture a high therapeutic value.

In America various mixtures of antibiotics (at times along with sulphonamide) have been used, *e.g.* an infusion of 500,000 units of crystalline penicillin + 250 mg. dihydrostreptomycin + 500 mg. sulphamerazine + 500 mg. sulphathiazole—Payne & Elliott (1953); or the above-mentioned quantity of penicillin with 250 mg. streptomycin in 10 to 15 c.c. of vehicle. Other infusions have been with bacitracin and penicillin or streptomycin—Waller & Bolton (1952); neomycin has also been used—Drury (1952), Simon *et al.* (1954).

For *Pseudomonas pyocyanae* infection polymixin 25 mg. doses has been used alone or together with dihydrostreptomycin, sometimes with the addition of penicillin.

Terramycin and bacitracin have also been used, with some good results. At times, parenteral treatment with antibiotics should also be considered, although this involves the use of higher doses.

Schipper (1953) has also advocated the intravenous use of oxytocin (10 to 40 units) in the therapy of mastitis. This allows for drainage of the udder by the action of the "let down" mechanism, so that on subsequent infusion a better penetration of the udder by any therapeutic agent is effected. More importance is also being attached to the dosage of the antibiotic, and the base of intramammary infusions. For this, some American workers advocate the use of 500,000 units of penicillin with or without the addition of 250 mg. streptomycin.

Prevention of Summer Mastitis

Owing to the varying incidence of summer mastitis, from year to year and from district to district, it is not easy to assess the value of antibiotics in preventing it. From several published reports on the matter, reference is made below to two. Prevention of the disease by infusion of penicillin when milking ceased showed that the incidence was: treated group—1.83 per cent.; untreated group—5.8 per cent., *i.e.* a reduction of 60 per cent. (*Report on Animal Health Services*, 1949-51. H.M.S.O. 1953).

Pearson (1951) published a report on 531 quarters of dry cattle injected with 100,000 units calcium penicillin in a beeswax and arachis oil base, on one, two or three occasions at intervals of 14 to 18 days, with untreated controls. Only two typical cases of *Corynebacterium pyogenes* were found in the treated group, and 28 in the control group. It does appear that prophylactic measures may be of value in reducing the incidence of this serious disease, but more work on it needs to be done.

Reproductive Diseases

These are a significant group of economic importance. Infertility, abortion, and inability to conceive are all too well-known symptoms; and there may be cervicitis, vaginitis or metritis present. Infection of the genital tract can be caused by several organisms. The following may be incriminated: *Brucella abortus; Corynebacterium pyogenes; Mycobacterium tuberculosis; "Pleuro-pneumonia"-like organisms; Staphylococci; Streptococci; Trichomonas foetus; Vibrio foetus.*

With the reduction in the incidence of abortion caused by *Brucella abortus*, attention has been focused on other causes, particularly on the part played by *Vibrio foetus* infection. The considerable amount of work done on abortion and infertility in cattle includes that of Chambers (1948), Bartlett (1949), Plastridge & Easterbrook (1950), Plastridge *et al.* (1951), Fincher (1952), Lawson (1952), and Powley (1952).

Vibriosis. It is now known that *Vibrio foetus* is sensitive to penicillin and streptomycin. The organism has a predilection for the genital tract and some workers (Plastridge *et al.*, 1951) have found that local application of certain antibiotics—particularly streptomycin—is effective. Clinicians frequently use intra-uterine infusions of penicillin and streptomycin in the treatment of vibriosis: parenteral administration of antibiotics is also employed.

The following are some of the recommendations for antibiotics to be used in infertility.

Plastridge, *et al.* (1951) in an extensive report on vibriosis have recommended that cows and heifers failing to conceive from two services should be given an intra-uterine infusion of 1 gramme streptomycin in 15 c.c. of sterile water at the time of the next heat and bred on the subsequent one. Cows having early abortions should be given treatment on the next heat and bred on the subsequent one.

Easterbrook *et al.* (1950) hold that 1 gramme streptomycin in 20 to 50 c.c. of distilled water is ideal for infusion into the uterus of cows four to five days before breeding.

McAuliff (1952, quoted by Fincher), suggests that as soon as infection is diagnosed, or suspected, the following should be used:

(1) In open cases—0.5 gramme streptomycin and 400,000 units of penicillin in water-in-oil emulsion instilled directly into the uterus, or

(2) At the next oestrus while the cow is still on heat, an infusion of 1 gramme streptomycin in 30 c.c. of sterile water, with breeding six to eight hours later. He also used an alternative method: an intramuscular injection of 1,500,000 units procaine penicillin twice daily for five days. Nine out of 10 cows so treated conceived at first service by an infected bull.

Woolffer (1952) used 100,000 to 300,000 units of crystalline penicillin in 10 to 20 c.c. of water, instilled into the uterus, and allowed service to take place half a day later: good results have been obtained with this treatment. *Trichomonas foetus* infection is now regarded as venereal disease, and so far has not yielded satisfactorily to treatment with antibiotics in the field. Experimental work on the subject continues.

"Pleuro-pneumonia"-like organisms in infertility have been reported upon by Dienes & Smith (1942), Edwards, Hancock, & Hignett (1947). The organisms have been isolated from cows with poor breeding histories when cervicitis, bursitis and salpingitis were encountered. These organisms are streptomycin-sensitive *in vitro*, but no clinical reports of their antibiotic treatment are available so far. A further complication is that the condition may sometimes mask infection due to other organisms.

Contagious granular vaginitis. Crawley & Willis (1950) at the Ontario Veterinary College have isolated a gram-negative organism from cases of this disease; *in vitro* sensitivity to penicillin, streptomycin and aureomycin have been established, but field results with them are not yet available.

Penicillin and streptomycin are also frequently used in cases of retained foetal membranes or difficult parturition.

In small-animal practice antibiotic treatment of endometritis is not frequently carried out, as surgery affords excellent results. But when it is possible to type the causal organism and administer an appropriate antibiotic, good results can be achieved. An example is the use of streptomycin in metritis due to *Bacterium proteus* infection.

Genital infections in the mare. Several types of bacteria may be found: *Streptococci, Staphylococci, Salmonella abortivo equina, Escherichia coli, Shigella equili, Pseudomona aeroginosa, Corynebacteria equii, Klebsiella pneumonia genitalium.* Penicillin and streptomycin are used for the treatment of diseases due to these organisms.

Diseases of the Urinary System

Bovine pyelonephritis. Before the introduction of penicillin, this was considered an incurable disease. Since then several investigators, Fox (1947), Kiesel *et al.* (1947), Beck (1948) and Arthur (1949), have reported successful treatment with various doses of penicillin; 1,000,000 to 2,000,000 units daily, totalling 10,000,000 units, are usually administered, but adequate treatment is essential to secure complete recovery, as was emphasised by the experimental work of Lovell & Cotchin (1949).

Canine cystitis and nephritis. Canine leptospirosis and its relation to renal disease is well known to clinicians: Broom (1949), Mills (1948), McIntyre & Stuart (1949), Lauder (1950), Joshua (1949).

McIntyre & Stuart (1949) have found evidence of leptospiral infection with renal disease in 116 out of 130 dogs; chronic nephritis of middle-aged and old dogs is encountered daily by clinicians. Since penicillin became available its wide use has produced good results in canine nephritis; McIntyre & Stuart (1949) have claimed it as a "specific" for canine leptospiral nephritis, and Weipers (1949), Freak & Joshua (1948) report good results from its use. American workers recommend the use of penicillin in the leptospiraemic phase of the disease, but once the organisms have become localised in the kidney tubules streptomycin must be given (Brunner & Meyer (1949)). It is now an established practice in America to use streptomycin to "clean up" potential carriers of leptospirosis. In this connection it is as well to remember that streptomycin is more active in an alkaline medium; most cases of nephritis have an acid urine, so that it may be necessary to treat them with an alkalising agent to ensure the effective action of streptomycin.

Mixed infections of nephritis and cystitis are frequently treated by penicillin or streptomycin, or both, with good results. The use of chloramphenicol in some late stages of canine nephritis may be of great value—always provided that treatment is initiated before the terminal phase or the late stages of uraemia. Routine urine analysis, general nursing and attention to diet are necessary adjuncts to treatment.

Virus Disease

Antibiotics are frequently used in such diseases as distemper and hard pad, but their value is then only for suppression of secondary bacterial infections. Even the broad spectrum antibiotics have little effect on the virus diseases met with in general practice. The larger viruses, however, *e.g.* those of psittacosis and lymphogranuloma, are sensitive to aureomycin, chloramphenicol and oxytetracycline, which have been used in treatment with good results, but hard pad, distemper and contagious canine hepatitis still present problems not solved by antibiotics. It is known that good clinical results are obtained by using chloramphenicol, oxytetracycline or aureomycin in cat influenza and distemper, but these are most probably due to the suppression of secondary infections. Virus pneumonia in pigs has been treated by antibiotics—again with only partly successful results on animals showing signs of secondary complications or relapse. Myxomatosis virus is not sensitive to antibiotics.

Pig Diseases

Swine erysipelas. Crystalline or repository forms of penicillin are used for treating this disease, but clinical reports indicate that best results are obtained by the simultaneous use of the antibiotic and immune serum.

Enteric Syndrome—"Scours." The organisms that may be associated with swine enteritis are *Salmonella (suipestifer* or *aertrycke, enteriditis) Shigella* and paracolon group, *Actinomyces*—possibly as a secondary invader, and *Vibrio* (Doyle (1944)). Necrotic enteritis is one of the commonest types of scours in pigs; provided that secondary systemic complications, *e.g.* pneumonia or peritonitis, have not developed, streptomycin administered orally is effective against it. The dose varies with weight, age and frequency of peristalsis, but usually 0.25 to 1 gramme, twice daily, is recommended. Secondary complications must be treated appropriately.

Diseases of Young Animals

Calves. Antibiotics are frequently used in various diseases of young animals. A new development is the oral use of streptomycin in calf scours. This antibiotic given by the mouth is practically unabsorbed into the bloodstream, and over 65 per cent. of the dose administered may be recovered in the faeces—Ellias & Duros (1945). Other reports indicate that nearly all of the oral dose is recovered in the faeces—Zintel *et al.* (1945), and Venzke (1949). Such oral use allows the antibiotic to act at the localised site of infection, *i.e.* the gastro-intestinal tract, without side effects or resistance developing: neither does it prevent any subsequent use of the antibiotic parenterally.

It has been found from differential microscopic count of normal calves' faeces that the bacterial population of the calf intestine is gram-positive organisms —43.07 per cent., gram-negative organisms—56.93 per cent. Henderson & McKay (1949), have done much work on white scours disease and have found that in it the bacterial flora is persistently gram-negative coliforms, gram-positive organisms disappearing to the advantage of the gram-negative group, which eventually may comprise the entire bacterial population. They recommend oral use of streptomycin for prophylaxis and treatment of white scours in calves, in doses of 0.5 gramme twice daily for treatment and 0.25 gramme twice daily for prophylaxis, both for three to four days. The dose may vary according to weight, age and frequency of peristalsis. Prophylaxis has been carried out on calves born on infected premises, as shown by the fact that the causal organisms were isolated from the premises themselves. Much work has been done on the scour syndrome and this latest development in prophylaxis and treatment with streptomycin should be of value.

Puppies and Kittens. There are some reports of the oral use of penicillin (Dickinson & Scott (1953)) for rearing weak kittens and puppies. The nutritional use of antibiotics is a large subject, not within the scope of this paper, but it is of interest to note their effect on weak kittens, in whom the incidence of enteric and respiratory infections had been much reduced by the use of 30 mg. of procaine penicillin per kilo of food.

Sinusitis in Turkeys

In this disease the use of streptomycin by direct instillation into the sinus is now an accepted form of treatment. Parenteral use of streptomycin for fowl coryza has also been described by De Bleick (1950).

Diseases of Skin, Ears, Eyes

Topical application of antibiotics in skin diseases in my experience is of limited value.

Eye Diseases

Several of the antibiotics are employed against most eye infections, particularly those secondary to virus infection. Results may vary; chloramphenicol in 0.25 per cent. solution or 0.5 per cent. ointment has been used successfully. In America bacitracin has also been used. Penicillin eye ointments are frequently employed.

Ear Diseases in Dogs and Cats

Many antibiotics are used for a variety of ear diseases. The following appear to give good results: chloramphenicol, as used topically in human medicine, can also be used successfully for obstinate cases of canine otitis; streptomycin solution by twice daily instillation into the ear may give excellent results in ulcerated otitis within three to four days of treatment; mixed penicillin and streptomycin ointments can give good results in ulcerated cartilage condition in cats. In America bacitracin has also given good results in ear cases. It is not wise to generalise on antibiotic treatment of ear diseases, as these can be produced by several causes resulting in varying lesions and appropriate treatment is essential.

In countries such as the U.S.A., where more antibiotics are available than here, other conditions are being treated by them. Anthrax, for which large doses of at least 1,000,000 units must be given, has been successfully treated. Good results are being claimed for the use of aureomycin and oxytetracycline against foot-rot; blackleg has been effectively attacked by large doses of penicillin given early in the course of the disease.

Finally it must be admitted that, although there are a great many reports on the use of antibiotics in specialised fields, *e.g.* nutrition, and good general surveys, such as that by Richou, R. (1952), there is insufficient information available on their use and efficacy in general practice in this country. This is unfortunate, for much valuable clinical information may never have been recorded.

Of antibiotics in general it may be assumed that their use is assured, and that penicillin remains the most important of them with some outstanding advantages; that streptomycin, because of its selective action, deserves wider application; and that the broad spectrum antibiotics will continue to command a specialised field, as will some of the more recently discovered members of the group.

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Report on the Treatment of Foot Rot in Sheep with Chloramphenicol

BY

P. M. F. SAMBROOK

THIRTY rams age one to two years (22 Romney Marsh breed and eight Southdowns), which had been running together, had been severely affected with foot rot for a period of six to seven months. During this time treatment had been carried out by the shepherd on numerous occasions; this consisted of cutting away the diseased horn and dressing with copper sulphate and Stockholm tar. Despite these repeated dressings, the feet continued to deteriorate, and by November, 1953, many of the animals had sinuses opening around and above the coronet with infected tracts running under the horn. In some places the bone was exposed, in others infection was trapped beneath granulation tissue.

In view of reports from Australia of successful results following the use of chloromycetin in the treatment of contagious foot rot in sheep (Stewart, 1953) it was decided to try chloramphenicol in the form of a 10 per cent. alcoholic solution. After cutting away the diseased horn, the drug was applied with a stiff brush and rubbed on to the exposed surfaces. The animals were kept penned up for one hour after treatment until the dressed feet were dry. Treatment was repeated at intervals of five to six days, and at the end of the third dressing all the affected feet appeared free from infection.

Owing to the advanced state of the condition when treatment with chloramphenicol was begun, granulation tissue persisted for some weeks and, when healing was complete, deformity of the foot and horn was apparent in some cases. All the animals, however, became sound and have remained sound to date (October, 1954) despite the adverse conditions under foot this summer.

Foot rot in rams is notoriously resistant to treatment, and the results in these animals were so encouraging that trials are now being carried out on larger numbers of Romney Marsh sheep, and an attempt is being made to keep controls, run under the same conditions, which will be treated with the standard foot-rot dressings of copper sulphate and tar.

Acknowledgment.—I am indebted to Messrs. Parke, Davis & Co., Ltd., for supplying the tincture of chloromycetin used on these sheep.

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Some Observations on the Use of Myelography for the Demonstration of Protrusion of the Intervertebral Disc in the Dog

BY

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Introduction

IN his experimental study of the spine of normal dogs Brook demonstrated the practicability of the introduction of contrast media to outline the spinal cord for the purpose of radiography (Brook, 1936). This procedure, which is commonly termed myelography, has since been employed by several workers to demonstrate suspected protrusions of an intervertebral disc in clinical cases in the dog (Green, 1951 ; Olsson, 1951 ; Hoerlein, 1953).

The purpose of this report is to record the results of the use of myelography in 30 cases of clinical protrusion of intervertebral discs seen while the author was working at the Royal Veterinary College, London.

At one stage myelography was employed as a routine in all cases of suspected disc lesions, but when it became apparent that there was some risk in the procedure, it was restricted to those cases showing no evidence of spontaneous recovery, in which operation was contemplated, and where no conclusive evidence of the site of the lesion could be gained from examination of a normal radiograph.

Technique

Contrast Media Employed

Two radio-opaque materials were used—Myodil and Neo-Hydriol Fluid—both of which are obtainable in this country.

Myodil is stated by the manufacturers to be a mixture of isomeric ethyl iodophenylundecylates and to contain 30 per cent. organically combined iodine.

Neo-Hydriol Fluid is described as containing 40 per cent. of iodine in organic combination and to consist of the iodised ethyl esters of the fatty acids of poppy seed oil manufactured by a method in which the original oil is saponified, the fatty acids esterified with ethyl alcohol, and the resulting esters are then iodised. Myodil was used in eight cases and Neo-Hydriol Fluid in the remaining 22, but it is felt that this is an insufficient number of cases to attempt to draw any comparison between the two preparations.

Anaesthesia

General anaesthesia has been induced in each case. On a few occasions pentobarbitone sodium was employed but this has been abandoned in favour of a light plane of anaesthesia induced with thiopentone sodium, and maintained with nitrous oxide, oxygen and minimal amounts of "Trilene" as described by Hall & Weaver (1954) for several reasons :—

Under deep anaesthesia the dog shows no response if the spinal needle is passed too deeply and damages the medulla.

On occasion the two rapid introduction of the myelographic agent (particularly if too cold) has been followed by cessation of respirations and under barbiturate anaesthesia the resulting anoxia has given rise to subsequent symptoms of brain damage, whereas when oxygen is being given continuously anoxia is prevented until respirations recommence.

Method

In 25 cases the contrast medium was introduced into the cisterna magna, in one case through the lumbo-sacral space, and in four cases it was introduced at both sites on the same dog. Lumbo-sacral introduction was found to be unsatisfactory as only on one occasion (Dog No. 55) was the injection considered to have been made into the subarachnoid space (shown by the fact that cerebro-spinal fluid flowed freely from the spinal needle). The other four attempts at introduction by this route are believed to have been epidural and here it was found that the medium did not pass freely along the vertebral canal.

The technique of cisternal puncture used was that described in detail by Brook (1936) and this was carried out employing strict aseptic precautions. Experience has emphasised the importance of certain points already made by Brook :—

1. It is essential that the skull should be flexed at right angles to the cervical vertebrae before attempting cisternal puncture.

2. It is necessary to ensure that the myelographic agent is at approximately body temperature when introduced and that it is injected slowly (taking some two minutes over the introduction).

The spinal needles used were short bevelled and of 19 to 21 British wire gauge and 3 to 3½ in. in length. (The author preferred plain needles without any grooves for indicating the depth of introduction, as it was found that the grooves were of little assistance and the needle tended to bend at the line of grooving.)

On careful insertion of the spinal needle into the cisterna magna it was found that provided pentobarbitone sodium was not used, any attempt to pass the needle too deeply immediately caused considerable stimulation and movement of the patient. Once cerebro-spinal fluid was flowing freely through the needle a quantity, slightly in excess of the amount of myelographic agent intended to be introduced, was removed and the warmed contrast medium slowly injected. Up to 3·0 c.c. of radio-opaque material has been introduced into the cisterna magna but experience has shown that 0·5 to 1·0 c.c. is usually sufficient.

On completion of the injection a pad is placed under the head to prevent the passage of material into the

skull. The table on which the dog is lying is then tilted at an angle of approximately 30°—the dog being secured by a belt passed around the chest and fastened to the upper end of the table with ropes.

Originally the dog was placed on its right side and radiographs were taken by placing the plate under the dog. By this method the myelographic agent gravitated to the right of the spinal canal and while disc protrusions were shown reasonably well in lateral pictures of the spine, it prevented any attempt to show on which side of the canal the lesion was situated. The present method is to place the dog on its sternum immediately after introduction of the myelographic agent and to take both lateral radiographs with the film held in a stand and pressed against the dog, and dorso-ventral pictures with the film placed under the patient. It has been found that this technique does not give such good detail as the X-ray plate cannot be so closely applied to the dog, but it is considered to produce a more accurate indication of the situation of any lesion. Normally lateral radiographs are taken at 10- to 15-minute intervals (after five minutes if a cervical lesion is suspected) until the opaque material is held up or outlines a protrusion—when a dorso-ventral exposure is made. Radiographs are taken until the material shows no evidence of moving for at least 30 minutes.

Following lumbo-sacral introduction of opaque material a similar radiographic technique was adopted but the dog was placed with its head at the lowest instead of the highest end of the tilted table.

Protrusion of an intervertebral disc was shown by a partial or complete hold-up of the myelographic agent at the level of that disc, or by indentation of the ventral line of the opaque column. While a complete hold-up of the material usually indicated a large rupture of the intervertebral disc it was found that this could occasionally result from a comparatively small protrusion particularly if of recent origin.

Results

The accompanying table gives details of those cases (16 in all) in which it was possible to check the accuracy of the myelographic findings either at *post-mortem* examination or at operation. Confirmation at operation was accepted when the lesion was actually seen and removed at laminectomy (one case) or where fenestration of the intervertebral disc indicated was followed by a rapid relief of the symptoms (three cases). The 16 cases may be summarised as follows :—

(*a*) In five cases the lesion was indicated accurately.

(*b*) In four cases of multiple lesions some of the protrusions were indicated.

(*c*) In one case the lesion was not accurately outlined by opaque medium until 24 hours after introduction.

(*d*) Three cases where myelography completely failed to indicate the lesion were considered to be cases of progressive ascending paralysis as described by Hoerlein (1953). Here *post-mortem* examination revealed an engorged condition of the spinal cord extending a considerable distance in front of the lesion and apparently preventing the flow of myelographic agent.

(*e*) In one case the disc indicated by myelography proved to be the one in front of the affected disc. (Here myelography was undertaken within 24 hours of the onset of acute symptoms, and experience has suggested that congestion of the adjacent cord may develop at the time, but subsequently subside.)

(*f*) In two cases myelography failed to demonstrate the lesion but in both these cases the introduction of cold material caused a cessation of respirations and it is considered that it may have also interfered with the flow of the myelographic agent.

The remaining 14 cases either made a spontaneous recovery or were not available for *post-mortem* examination. Results here were :—

(*a*) In 11 cases the radio-opaque material flowed freely and is considered to have outlined a lesion.

(*b*) One case showed symptoms of progressive ascending paralysis and here the myelographic agent failed to flow.

(*c*) One case in which the material was injected epidurally at the lumbo-sacral space and failed to flow.

(*d*) One case in which no evidence of the 0·5 c.c. of Neo-Hydriol Fluid injected could be found on X-ray examination. It is considered that the Neo-Hydriol Fluid may have been injected intravenously as blood was obtained from the spinal needle.

Complications

In three cases, in all of which pentobarbitone sodium was used as the anaesthetic there was a temporary cessation of respirations immediately following the introduction of myelographic agent into the cisterna magna. This was considered to be due either to direct damage to the medulla from the spinal needle, or to the effect of the introduction of the opaque material too rapidly or at too low a temperature. These dogs all showed evidence of damage to the central nervous system on recovery from the anaesthetic and were destroyed.

One dog was reported to have developed fits and died eight days after performing myelography. No *post-mortem* examination was possible, but as the myelographic agent was completely held up in the cervical region it is conceivable some entered the cranium and caused a meningitis.

One other dog with a lesion in the cervical region showed less acute nervous symptoms for some time (whining and uneasiness), but it was not possible to say definitely if this was connected with the myelography.

In another case X-ray examination revealed that a considerable quantity of myelographic agent had entered the cranium but no ill effects were observed.

No attempt was made to remove the opaque material and no other subsequent complications have been noted—the follow-up period for the 13 dogs that survived varying from three weeks to 14 months.

Conclusions

One reason for publishing this paper has been to stress the risks associated with myelography, risks which the author feels have not always been sufficiently emphasised in the literature on the subject. These dangers can be minimised by experience and strict attention to a careful technique but it is felt that only those dogs which come within the category mentioned in the introduction to this article should be subjected to the procedure.

DOUGLAS, S. W.—SOME OBSERVATIONS ON THE USE OF MYELOGRAPHY FOR THE DEMONSTRATION OF PROTRUSION OF THE INTERVERTEBRAL DISC IN THE DOG

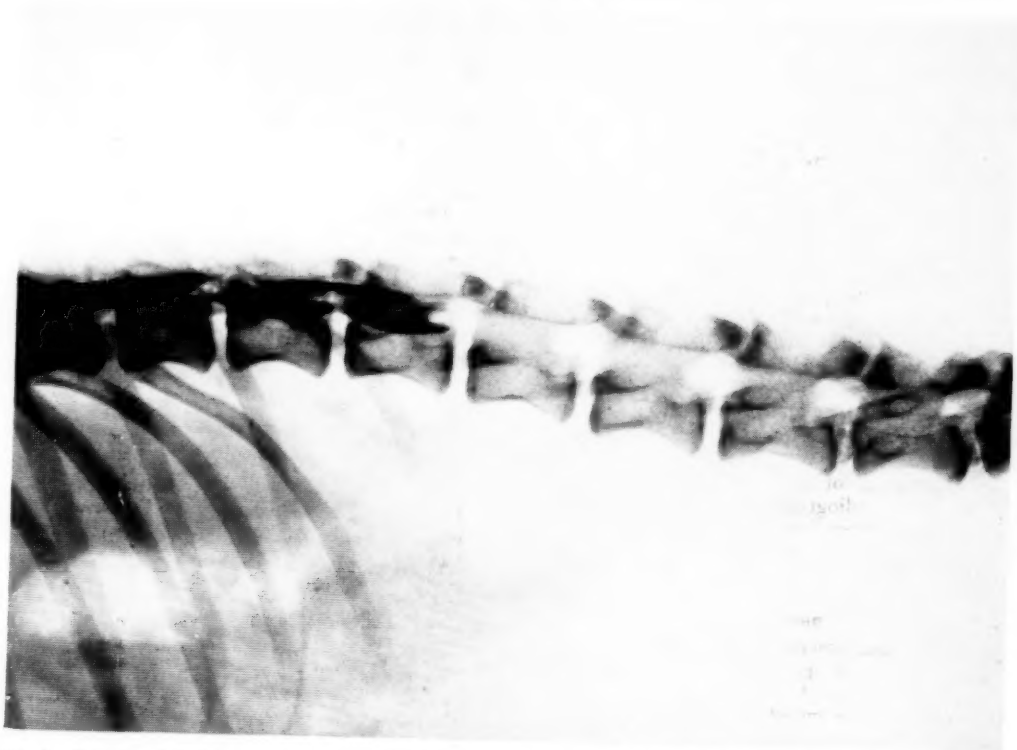

FIG. 1. DOG NO. 55.—Myelogram showing complete hold-up of Neo-Hydriol Fluid in front of intervertebral disc L2.

FIG. 2.—The same dog as that shown in Fig. 1, but after the introduction of Neo-Hydriol Fluid at the lumbo-sacral space. The Neo-Hydriol Fluid was held up immediately posterior to intervertebral disc L2.

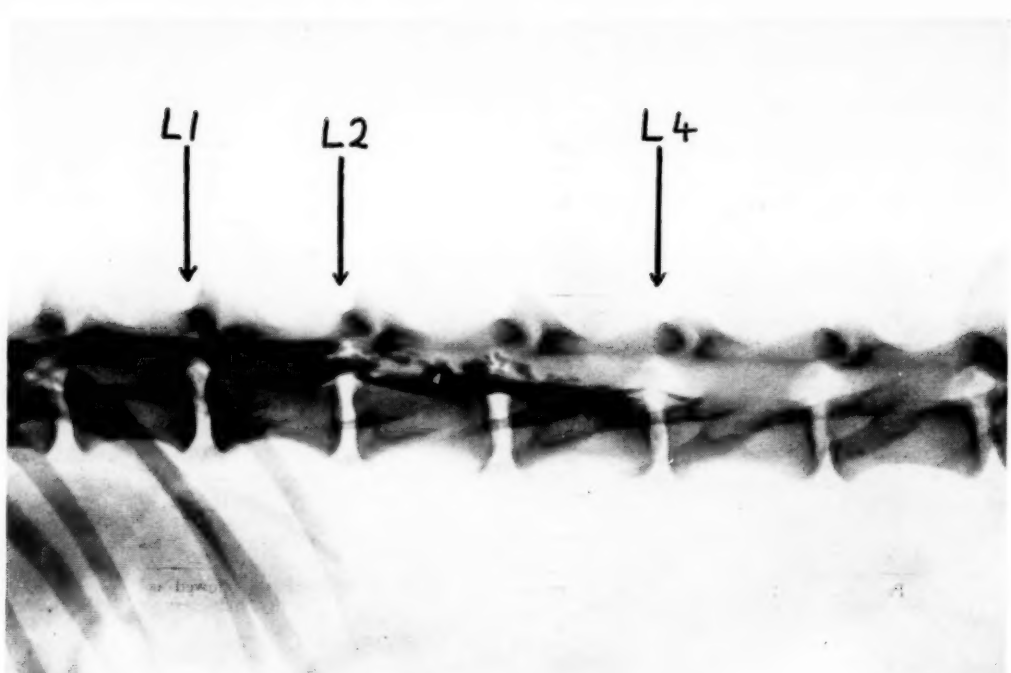

FIG. 3. DOG NO. 57.—Here the Neo-Hydriol Fluid showed protrusions of the intervertebral discs L1 and L2 and was held up in front of L4 for at least 30 minutes.

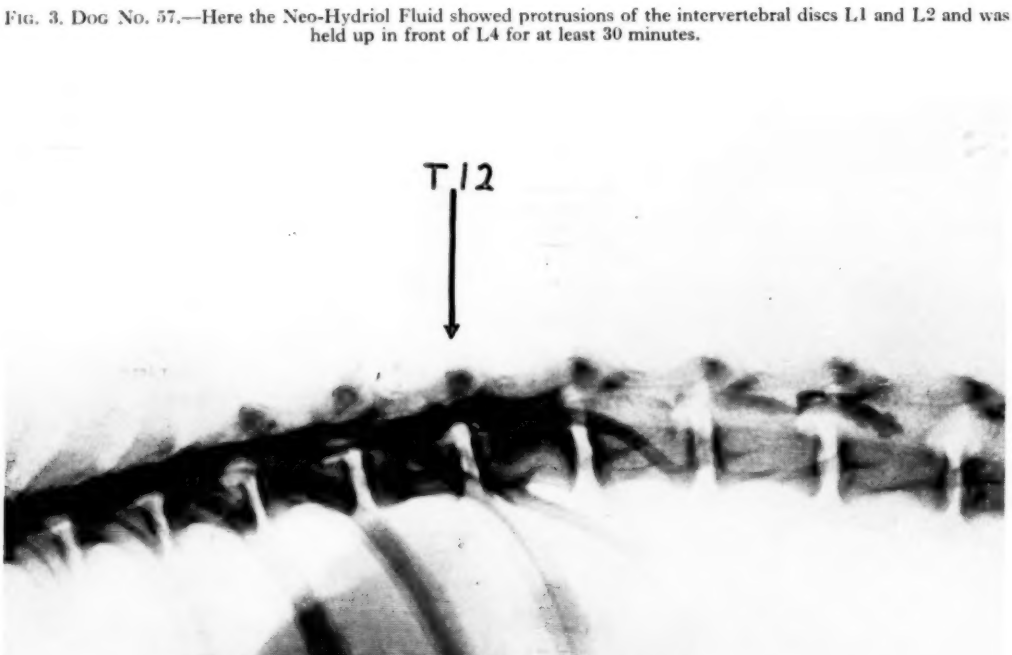

FIG. 4. DOG NO. 58.—Myelogram showing a small protrusion of intervertebral disc T12 outlined by Myodil.

TABLE

Dog number	Breed, age and sex	Symptoms	Site of injection	Material injected	Demonstration of lesion	Complications	Confirmation at *post-mortem* examination or operation
50	Mongrel, 8 years, f.	Paraplegia	CM	3·0 c.c. N	Complete block at T6	None in 2 days	Destroyed after 2 days for ascending paralysis.
			L-SS	2·0 c.c. N	Epidural, did not flow		P.M.E. : rupture of T12. Congestion of cord from T2.
55	Pekinese, 3½ years, m.	Recurrent pain and paraplegia	CM	1·5 c.c. N	Complete block at L2. Protrusion at T13, L1	None in 12 days	Died at attempted operation. P.M.E. = s nall old protrusions T9, T13, L1, L4. Recent ruptures at T11, L2. (Rupture of T11 believed to have occurred subsequent to myelography.
			L-SS	1·0 c.c. N	Subarachnoid, complete block posterior to L2		
57	Spaniel, 5 years, m.	Recurrent paraplegia	CM	2·0 c.c. N	Complete block at L4. Protrusion L1, L2	None in 13 days	Protrusion of L4 shown at operation. Subsequent P.M.E. = old protrusions at L1, L3, L5, L6.
			L-SS	1·0 c.c. N	Epidural, did not flow		
58	Corgi, 5 years, f.	Paraplegia	CM	1·5 c.c. M	Small protrusion, T12	Temporary apnoea on introduction of needle	Dog showed evidence of damage to central nervous system, destroyed P.M.E. = small protrusion at T12.
59	Scotch Terrier, 8 years, f.	Paraplegia	CM	1·5 c.c. M	Partial block at L1	None in 6 months	Rupture of L1 confirmed and removed at operation.
60	Pekinese, 4 years, f.	Ascending paralysis	CM	1·25 c.c. M	Complete block at C1	Died 12 hours later, considered due to ascending paralysis	P.M.E. = rupture of L3. Congestion of whole cord.
63	Spaniel, 4 years, f.	Acute pain	CM	1·0 c.c. M	Complete block at C2	Apnoea for 3 minutes on introduction of myelographic agent	Destroyed for brain symptoms. P.M.E. = rupture of C4. Congestion of cord. ? Ascending paralysis.
65	Mongrel, 6 years, m.	Pain about neck	CM	1·0 c.c. N	Complete block at C1	None in 3 months	Recovery after fenestration of C1.
71	Dachshund, 5 years, f.	Pain about neck	CM	0·5 c.c. N	Protrusion outlined at C2	Some whining after 3 weeks	Recovery after fenestration of C2.
72	Spaniel, 8½ years, f.	Pain about neck	CM	1·0 c.c. N	Block at C1. X-ray taken 24 hours later indicated lesion at C4	None in 16 days	No relief following fenestration—destroyed. P.M.E. = large rupture at C4.
79	Dachshund × Spaniel, 4 years, m.	Pain and inco-ordination	CM	1·0 c.c. N	Partial block at T13	None in 6 months	Recovery after fenestration of T13.
83	Spaniel, 1½ years, f.	Ascending paralysis	CM	1·0 c.c. N	Complete block at T4	None—destroyed immediately after	P.M.E. = rupture of L5. Congestion of cord from T4.
86	Spaniel, 3½ years, f.	Paraplegia	CM	1·0 c.c. N	Did not flow freely or beyond C4	Temporary apnoea on introduction of myelographic agent	Destroyed for brain symptoms. P.M.E. = rupture of L4.
95	Sealyham, 5 years, m.	Recurrent paraplegia	CM	1·0 c.c. N	Partial block at T11	None in 2 days	Destroyed. P.M.E. = protrusion of T11, L3 ; rupture of L4.
102	Dachshund, 5 years, f.	Recurrent paraplegia	CM	1·0 c.c. N	Protrusion outlined at T11	None in 2 days	Destroyed. P.M.E. = old protrusion T11. Large rupture of L2. (Myelography not maintained for long enough period.)
103	Dachshund, 5 years, m.	Paraplegia	CM	0·75 c.c. N	Complete block at T13	None in 19 days	Destroyed. P.M.E. = small protrusion at L1.

BREVIATIONS.—CM = cisterna magna, L-SS = lumbo-sacral space, M = Myodil, N = Neo-Hydriol Fluid. In indicating the level an intervertebral disc, C = cervical region, T = thoracic region, L = lumbar region—the accompanying numeral referring to the mber of the intervertebral disc in that region (bearing in mind that C1 is situated between the second and third cervical vertebrae).

In the author's opinion, however, myelography is practicable in the dog, and may be of assistance in identifying or in confirming protrusion of the intervertebral disc in those dogs in which a normal radiograph fails to reveal the lesion or in which there is some doubt as to the accuracy of the diagnosis.

Summary

1. Myelography employing either Myodil or Neo-Hydriol Fluid as the radio-opaque medium was performed in 30 clinical cases of prolapse of an intervertebral disc in the dog.

2. Protrusion of an intervertebral disc was successfully shown in 21 cases but in some dogs additional prolapses were missed.

3. Myelography is of no use in cases of progressive ascending paralysis (four cases in the present series).

4. It is considered that the five other failures to indicate a lesion were due to faulty technique and could probably have been prevented.

5. Deep barbiturate anaesthesia is contra-indicated for performing myelography.

Acknowledgments.—While the practical work described was carried out at London, this paper was only completed after the author had moved to Cambridge, and the author's thanks are due to Mr. G. C. Knight for permission to publish this report.

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The Myodil and Neo-Hydriol Fluid used in this work was kindly provided for clinical trial by the respective manufacturers—Messrs. Glaxo Laboratories, Ltd., and Messrs. May & Baker, Ltd.

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AGRICULTURAL IMPROVEMENT COUNCIL

Professor Sir James Scott Watson, C.B.E., M.C., LL.D., D.SC., who recently retired from the post of Chief Scientific and Agricultural Adviser, and Director-General of the National Agricultural Advisory Service, has been appointed a member of the Agricultural Improvement Council for England and Wales.

Professor H. G. Sanders, M.A., PH.D., who succeeded him as Chief Scientific and Agricultural Adviser has relinquished his membership of the Council and will in future attend meetings in his official capacity.

Professor Sir James Scott Watson was born in 1889 in Angus, Scotland, the son of a tenant farmer. He was educated at Edinburgh University, Royal Agricultural College, Berlin, and at Iowa State College of Agriculture, U.S.A. He was Professor of Agriculture at Edinburgh University, 1922-25, and at Oxford University, 1925-42.

An Outbreak of Diarrhoea amongst Grazing Steers attributed to *Salmonella manhattan* Infection

BY

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This paper records an outbreak of S. manhattan infection in a herd of steers grazed on "commons" grass pasture in the parish of Manchester, Jamaica, B.W.I.

Introduction

ALTHOUGH cattle do not appear to be an important reservoir of *Salmonella* infection, a number of strains have been isolated from them or from beef or dairy products. Topley & Wilson (1946) list *S. dublin* and *S. typhimurium* as the two most commonly occurring species of *Salmonella* in cattle but report *S. cholerae-suis, S. enteritidis, S. rostock, S. abortus-equi, S. abortus-ovis* and *S. morbificans-bovis* as occurring from time to time. In England Field (1949) recovered *S. dublin* on 257 occasions, *S. typhimurium* on nine occasions, *S. derby* on eight occasions and *S. enteritidis* and *S. brancaster* once each from 2,552 bovine bile samples examined. The types of *Salmonella* species affecting cattle are similar in other countries although there appears to be a preponderance of species such as *S. typhimurium, S. cholerae-suis* and *S. derby* in the New World.

Reports of the isolation of *S. manhattan* are few. Edwards & Bruner (1942) report its isolation from reptiles and hogs. Bergey (1948) records its isolation from chickens by Buschnell and from a turkey by Hinshaw. Human infection in Massachusetts was reported by Bornstein & Saphra (1942). The organism appears more frequently in the New World but has been reported in the United Kingdom in imported spray-dried egg powder. No record of the isolation of *S. manhattan* from bovines has been found, and for this reason the present outbreak appears worthy of record.

History of the Outbreak

On April 9th, 1952, 72 two-year-old steers on loan from a bauxite mining company were brought on to Grove Place Agricultural Station for use in a grazing experiment. They were kept on common land and Napier grass (*Pennisetum purpureum*) for two months and then on June 10th put on to *Indigofera endecaphylla* for one to two hours and then on to a paddock of "commons" pasture consisting predominantly of "crab grass" (*Stenotaphrum secundatum*). The steers were rotated from paddock to paddock as required by the experiment, spending four to six days in each paddock.

On June 9th, one of the steers was seen to be purging and on June 10th another was affected. These two (Nos. 22 and 37) were promptly isolated. On June 13th another steer (No. 12) and six days

later a fourth (No. 61) were seen to be purging. Johne's disease was suspected and faecal samples taken. Examination for acid-fast bacilli was negative but there was a high strongyle egg count. Due to a misunderstanding of the length of time that they were on the *Indigofera*, a plant known to be toxic to in-calf cows and young chicks, it was thought at first that this legume might have caused the symptoms.

On June 23rd No. 22 died, on July 15th No. 61 died and on the same day No. 37 was destroyed. No. 12 died four days later. Autopsies were carried out, and sections of intestine and smears were taken. Histological sections of the large intestine showed some inflammatory reaction with hyperaemia and hyperplasia of lymphatic tissue but no specimens yielded evidence of Johne's disease or showed acid-fast bacilli on microscopic examination.

One hundred grammes of faeces taken from No. 37 were fed by stomach tube to a non-incontact calf at the laboratory at Hope, but without result, the calf remaining free of symptoms for some six weeks.

Of the original four that were purging, all had died or were killed *in extremis*. Of the 68 animals which remained, a dozen that were thin were isolated, and of these three were weak and were purging. Nineteen of these eventually developed symptoms and of these 10 died. On August 7th faecal samples were taken from Nos. 27, 34, 40, 46, 47, 48, 51, 54, 58, 63 and 72. *Pseudomonas spp.* were isolated from Nos. 27, 34, 40, 48, 54 and 73. From No. 58, however, a *Salmonella* was isolated which was later identified as *S. manhattan*. Most samples contained fair infestations of strongyle eggs.

Following the original outbreak, 900 head were examined on the four different farms belonging to the bauxite mining company from which the herd had originally been collected. On two of these properties about 15 head were found to have slight diarrhoea and were isolated.

On August 15th, samples were taken from Nos. 34, 48 and 51 for bacteriological examination, only *Alcaligenese spp.* being isolated from Nos. 34 and 51.

On October 1st a faeces sample from steer No. 48 yielded a *Salmonella* later identified as *S. manhattan*, and also an organism thought to be a *Vibrio*, possibly *V. jejunei*. On October 9th steer No. 48 was killed *in extremis*, and *S. manhattan* isolated from the colon. On October 22nd No. 72, which had been wasting, finally died and *Pseudomonas spp.* isolated from faeces. There was also a heavy infestation of strongyles. On November 18th No. 63 died and *S. manhattan* was isolated from the faeces.

Cultures of pond water and pond mud failed to reveal *Salmonella*.

Symptoms and Lesions

The outbreak was sudden in onset but not explosive, and symptoms, while severe, were progressive over a period of two to four weeks, rather than rapidly fatal. The characteristic symptom was a chronic, usually intermittent diarrhoea which was bright green, frothy and had a very offensive smell. The diarrhoea was accompanied by loss of flesh and bodily condition although the appetite remained good throughout. Animals *in extremis*, too weak to rise, would lie on their sides and eat grass hungrily. There was no fading of coat colour but the animals became hidebound and dehydrated.

At autopsy the carcases were emaciated, the mesenteric lymph nodes were swollen and congested. There was a varying amount of inflammation and thickening in the wall of the small and large intestines somewhat resembling the lesions of Johne's disease. In one animal, No. 48, the abomasum was acutely inflamed.

Sections of bowel and lymph nodes were made and stained by Ziehl-Nielson, haematoxylin and eosin, and Gram methods. No trace of acid-fast bacilli could be seen and the pathognomic picture of eosinophilia, associated with Johne's disease, was absent.

Treatment

As soon as the outbreak occurred, a section of the pasture containing a pond was fenced off and here the sick steers were isolated. About the middle of September, the pond itself was fenced off, water and cut grass being brought from elsewhere.

Various medicinal treatments had been tried during the course of the outbreak and some of these, such as astringents, appeared to check the diarrhoea for short periods. Before the isolation of *Salmonella*, on the remote possibility that the condition might be related to "teart," six animals (Nos. 51, 57, 63, 58, 48 and 25) were dosed with copper sulphate at the rate of two grammes daily for six days, but without effect. A preparation of phenylsalicytate ("Salol") was fed to Nos. 22, 37 and 12 at the rate of two drams twice daily for five days, also without effect.

After *Salmonella* had been isolated, treatment with chloromycetin and streptomycin was started. Eighteen tablets containing chloromycetin 250 mg. and streptomycin 250 mg. were given daily for eight days to steer No. 63, but this animal eventually died and *S. manhattan* was isolated from the faeces.

Discussion

Although the organism was isolated from only two out of ten animals succumbing and from only one out of nine affected animals which recovered, it seems reasonable to attribute this outbreak to *S. manhattan* infection.

With the exception of the *Vibrio spp.*, no other potentially pathogenic organism was found in the dung, organs, or other material examined.

Although the number of isolations appears small, it must be pointed out that no cultural work was carried out in connection with the first four cases and that even later no particular suspicion of salmonellosis existed so that small numbers of colonies may have been overlooked. Moreover, by the time a definite report of *S. manhattan* infection had been obtained from the United Kingdom, the outbreak had subsided; otherwise a greater number of specimens would have been examined bacteriologically and greater attention paid to slightly affected animals and in-contacts.

(Concluded at foot of col. 1 overleaf)

Current Literature

DIGEST

The Beta Ray

Some uses for radioactive isotopes in veterinary practice are described in two papers by Wheat *et al.* and Michaelson. The therapeutic agent is the beta ray, which, like the X-ray, induces ionisation of the chemical constituents of a cell, and thereby causes tissue destruction. Cells in a state of rapid multiplication, particularly tumour cells, are very sensitive to radiation, and they can therefore be destroyed by doses of radiation which would leave normal tissue unharmed. The beta rays, unlike X-rays, do not penetrate deeply into tissue, and their activity is confined to a depth of a few millimetres. This limited activity is useful for the topical treatment of the eye, where the underlying structures, such as the lens, are easily and irreparably damaged by radiation.

The source of the beta ray is the radioactive isotope Strontium 90. This material is contained in an applicator, which, according to the illustration given by Michaelson, resembles a pencil made of steel and aluminium, one end of which is expanded to hold 50 mc. of the Strontium 90. A circular shield, 4 inches in diameter, made of a transparent plastic, is fixed around the middle of the applicator. The beta-ray particles which are emitted from this source, represent an output of approximately 50 roentgen equivalent physicals (r.e.p.) per second. The amount of radiation is therefore controlled by the time the applicator is exposed to the tissue.

Michaelson used beta-ray therapy in the dog, for the treatment of superficial conjunctival tumours, the suppression of corneal vascularisation, and to remove pigmentation of the cornea. A dose of 300 to 400 r.e.p. was used, representing an exposure of six to eight seconds, which may be repeated at bi-weekly intervals. Wheat and his co-workers used a single dose of 25,000 r.e.p. for the removal of epithelioma of the eye in cattle, and obtained a satisfactory response in 34 out of 35 cases. Before treatment the eye was anaesthetised and fixed by sutures through the sclera at the limbus or, in the cow, by clamps. Dogs were given a general anaesthetic, but cattle were held in stocks, and their heads restrained.

Magnesium Sulphate Poisoning in a Cow

The administration of 2 lb. of magnesium sulphate dissolved in a quart of water, as a drench to a cow, is believed by Blake to have caused a toxic reaction. Some hours after receiving the drench, the animal went down, appeared to be blind and was unable to rise; respirations were shallow and slow. There was a rapid response to treatment with dextrose and calcium by intravenous injection. Blake reviewed the toxicology of magnesium sulphate solutions given by mouth, and indicated that a high concentration of the salt may result in some absorption from the alimentary tract. The toxic effects are those of hypnosis, respiratory depression, and paralysis of striated muscle. The antidotes are calcium and eserine.

Wing Fractures in Birds

Some advice on the treatment of wing fracture in pet birds is given by Dykstra. The fracture is usually of the humerus, and frequently seen in canaries as a result of their excited fluttering in a cage. The broken wing is folded, with the other wing, on to the body of the bird, so that the tips of the two wings cross over the lumbar-sacral region, where they are held in position by a strip of adhesive tape. A second, wider piece of tape is passed around the body, including both wings, and across the fractured area. These two pieces of tape are anchored by a third strip of tape, which is passed along the back of the bird. The tapes are left in position for three weeks by which time the fracture should have mended.

D. W. J.

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DYKSTRA, R. R. (1954). *Ibid.* 478.

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The general clinical picture with the varied severity of symptoms and the failure to respond to medication is in keeping with a salmonellosis. It may be that the clinical picture in some animals was exaggerated by the decision to isolate all "suspicious" cases in a small paddock in which they were forced to drink water from a single pond. This was felt desirable, before a diagnosis had been made, to prevent further spread to healthy animals. Later when the pond was fenced off and water and feed supplied in troughs, the outbreak subsided.

Summary

The occurrence of a severe outbreak of diarrhoea amongst a herd of 72 steers is recorded. Ten died and a further nine recovered after showing symptoms. *S. manhattan* was isolated from bowel contents or dung of two steers which later died and from one that recovered.

Acknowledgments.—The authors wish to express their gratitude to Dr. Louis Grant of the University College of the West Indies, for his advice and assistance in the typing of organisms, and to the Director of Agriculture for permission to publish this paper. The technical assistance of Mr. Gilbert Smith is gratefully acknowledged.

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EDWARDS, P. R., & BRUNER, D. W. (1942). *J. infect. Dis.* **72.** 64.

TOPLEY & WILSON (1946). *Principles of Bacteriology and Immunity.* Third Edition. London.

Bergey's Manual of Determinative Bacteriology. Sixth Edition, 1948. Baltimore.

BORNSTEIN, S., & SAPHRA, I. (1942). *J. infect. Dis.* **71.** 55.

FIELD, H. I. (1949). *Vet. Rec.* **61.** 276.

News and Comment

R.C.V.S. EXAMINATIONS

Dublin

Second Examination

Physiology Only—Atock, M. A.; Corcoran, M. P.; Hernon, John; Jones, R. F.; Kelleher, J. F.; McDonald, W. E.; McLaughlin, David; Mansfield, M. P.; Martin, W. H.; Schlesinger, P.; White, J. E.

Anatomy Only—Lydon, C. T.; Lyons, V.; Maher, James; O'Donnell, L. J.

Third Examination

Hygiene Only—Cox, Edward; Daly, D. J.; Dargan, Peter; Devereux, W. R.; Fogarty, W. P.; O'Neill, J. J.; Wallace, James.

Pathology Only—Carroll, Miss U.; Dunne, L. G.; Eastword, P. J.; English, R. G.; Evans, J. A.; O'Neill, W. J.; Nolan, J. J.; Roche, J. V.; Sheridan, J. J.; Stack, P. D. J.

Final Examination

Foley, J. E.; Gordon, James; Hally, W. P.; Heneham, M. D.; Houlihan, T. V.; Jameson, J. G.; McElroy, Robert; McInerney, J. F.; McManus, Dermot; Magee, B. F.; Noonan, J. D.; Rhatigan, P. J.; Smyth, P. W.; Toolan, G. A.; Tynan, A. R.; Wright, M. L.

ACCESSIONS TO THE R.C.V.S. LIBRARY

The following publications have been received in the library.

AKESSON, M. Kataolog över den äldre Boksamlingen vid veterinärinrättningen. Stockholm, Kgl. Veterinarhogskolan, 1954.

AUSTRALIAN VETERINARY ASSOCIATION. Annual Conference [Report], 1954. Melbourne [A.V.A.], 1954.

BRODY, S. *and others*. Environmental physiology and shelter engineering, with special reference to domestic animals. XXV. The effect of wind on milk production, feed and water consumption and body weight in dairy cattle. Columbia, Missouri A.E.S. 1954.

FIJI. Department of Agriculture, Annual Report for the year 1953.

KIBLER, H. H., *and* BRODY, S. Environmental physiology with special reference to domestic animals. XXVII. Influence of wind on heat exchange and body temperature regulation in Jersey, Holstein, Brown Swiss, and Brahman cattle. Columbia, Missouri A.E.S. 1954.

JONES, T. C., *and* GLEISER, C. A. Veterinary necropsy procedures. London, Pitman, 1954.

KNUDSEN, O. Cytomorphological investigations into the spermiocytogenesis of bulls with normal fertility and bulls with acquired disturbances in spermiogenesis. Lund, Hakan Ohlssons Boktryckeri, 1954.

SCHERER, H. Nebennieren—und Schilddrüsenveränderungen beim enzootischen Herzod des Huhnes. Munchen Institut für Tierpathologie, 1954 (Inaugural dissertation).

TALLMAN, K. L., *and* HERMAN, H. A. Adaptations and limitations of ring test for bovine brucellosis. Columbia, Missouri A.E.S. 1954.

UDALL, D. H. The practice of veterinary medicine. *Sixth edition*. London, Baillière, Tindall & Cox, 1954.

ULLBERG, S. Studies on the distribution of S^{35}-labelled benzylpenicillin in the body. Stockholm, Kngl. Veterinär hogskolans, 1954.

SOUTH AUSTRALIA. Institute of medical and veterinary science. 15th Annual Report of the council. 1952/53. 1954.

SYNDICAT NATIONAL DES VETERINAIRES. Congrès de Bordeaux, 1954. Paris, Syndicat, 1954.

—— —— —— —— Le statut professionnel des vétérinaires. Paris, Syndicat, 1954.

NEW FIELD STATION FOR THE ROYAL VETERINARY COLLEGE

It has just been announced that the College has purchased The Hawkshead House and Bolton's Park estate at North Mimms near Potters Bar. The estate includes 400 acres of farm land together with a number of buildings, of which the main house will be used for the accommodation of senior members of the Field Station staff.

The new Field Station is much more accessible from Camden Town than is Streatley, which will be vacated in stages until all the College's field work will take place on the new estate.

Formal possession of the property will begin on February 8th.

SPECIAL UNIVERSITY LECTURES

A course of two lectures on "Some Infertility Factors in Domestic Animals," by Professor Nils Lagerlöf, Professor of Obstetrics and Gynaecology at the Royal Veterinary College of Sweden, Stockholm, will be given at the Royal Veterinary College, London, at 4 p.m. on March 3rd and 4th.

At the first lecture the Chair will be taken by Mr. G. N. Gould, J.P., M.R.C.V.S.

The Lectures are addressed to students of the University and to others interested in the subject. Admission is free, and without ticket.

R.C.V.S. OBITUARY

JACKSON.—Sidney Tunstall (Capt., late R.A.V.C.), of 21, Harwin Road, Scottsville, Pietermaritzburg, Natal, South Africa. Graduated Liverpool, December 17th, 1915. Died November 30th, 1954.

ERRATUM

We very much regret an error in the reference to the late Mr. J. B. Ellse, veterinary practitioner, of 119, Nottingham Road, Derby, which appeared in last week's issue. By reason of the fact that this gentleman's Christian names were the same as those of Mr. J. B. Ellse, M.R.C.V.S., of 56, Dairy House Road, Derby, a confusion of identities occurred. We tender our apologies with this explanation.

APPOINTMENT OF DR. D. G. HARVEY

Dr. D. G. Harvey has been appointed to the university Readership in Chemical Pathology tenable at the Royal Veterinary College.

TUBERCULOSIS (ATTESTED HERDS) SCHEME, 1950

The Ministry's attention has been drawn to cases where cattle sold as attested have been accepted by the purchaser without the appropriate movement permit identifying the stock as attested. Some of these cattle have been found to be reactors to the tuberculin test soon after arrival at the purchaser's farm. Farmers are reminded of the importance, in their own interests, of insisting that all animals purchased as attested or supervised are accompanied, when delivered, by the official permit which identifies them by the recognised earmarks, and of buying such stock only from sources known by them to be reliable and under conditions which assure observance of all the conditions of the permit requirements.

POSSIBLE RESULT OF MYXOMATOSIS

The Ministry of Agriculture are preparing for an investigation of the dietary likes and dislikes of foxes after complaints about their depredations on agricultural holdings where myxomatosis has destroyed many rabbits.

Concurrent inquiries into other disturbances caused by myxomatosis in the balance of nature are being undertaken by the Nature Conservancy, and attention is being given to possible results on birds of prey.

The complaints that prompted this renewed interest were made mostly by farmers in the southern and south-western areas of England and the Welsh uplands, where foxes were said to be preying even on large lambs and grown sheep. A few isolated farms in Durham have been cleared of poultry.

Two theories have been advanced to explain the apparent growth of raids. One is that foxes are avoiding districts in which rabbits have been destroyed and are congregating in those where other small animals and poultry are plentiful. The other is that large enclosures made to protect new forests in some hill districts are providing safe conditions for multiplication of the animals, which maraud in areas round about.

FOWL PEST: NEW MEASURES

As from January 17th, 1955, the present " clean " area comprising Wales, Cheshire, Derbyshire, Shropshire, Staffordshire, Herefordshire, Worcestershire, and Warwickshire, into which the movement of live poultry from the rest of Great Britain is prohibited, is extended to include the following areas:—

South-west area: The Isles of Scilly and the counties of Wilts, Dorset, Gloucester, Somerset, Devon, and Cornwall.

Northern area: The counties of Cumberland, Northumberland, Westmorland, Durham, York (North Riding), York (East Riding), and the Furness Division of Lancashire.

Subject to suitable safeguards, the Ministry will be prepared to agree to the movement of live poultry between the separated " clean " areas of England and Wales, in sealed railway vans.

A new provision makes it compulsory for the tail feathers of all poultry sent to licensed sales of poultry intended for immediate slaughter in England and Wales to be clipped to such an extent that not more than half the original length of the main tail feathers of the bird remains.

The expression " store poultry " has been amended to exclude only those geese that are under the age of nine days (instead of 28 days as formerly). Ducks are at present similarly excluded from the general definition of " store poultry."

In view of the improvement in the fowl pest position in Mid-Lancashire, the Minister has made an Order revoking as from February 1st the special restrictions imposed on the movement of store poultry into and out of that area. The ban on store poultry markets and exhibitions is also withdrawn at the same time.

MINISTRY OF AGRICULTURE VETERINARY FIELD STAFF

Mr. N. D. Baird, M.R.C.V.S., D.V.S.M., Veterinary Officer, has been transferred from Carlisle to Cockermouth. Mr. W. I. Maconkey, M.R.C.V.S., Veterinary Officer, has been transferred from Aberystwyth to Gloucester. Mr. W. D. Williams, M.R.C.V.S., Veterinary Officer at Aberystwyth has resigned. The following Ms.R.C.V.S. have been appointed to the permanent staff as Veterinary Officers: Mr. R. J. Jones, stationed at Caernarvon; Mr. M. O'Connor, stationed at Aberystwyth; Mr. E. J. Ruane, stationed at Llandrindod Wells.

BRITISH VETERINARIANS IN THE SUDAN

As a result of the Sudan Government's policy of Sudanisation of expatriate staff, the following British veterinarians in the Department of Animal Production will have left the country by the end of February: Messrs. J. T. R. Evans; J. D. M. Jack; A. W. Chalmers; I. A. Gillespie, O.B.E.; P. Durran; J. K. Thomson; D. G. Clow; D. J. Stewart; M. J. Henigan; A. W. Polden; T. G. E. Gibson; and D. F. Hamilton.

In addition Messrs. F. W. Priestley, P. Z. Mackenzie, M.B.E., and J. D. Paterson have resigned their appointments.

COMING EVENTS

Jan. 26th.—General Meeting of the Lancashire Division, B.V.A., in the University Veterinary Hospital, Pembroke Gardens, Liverpool, 2.30 p.m.

Jan. 27th.—Annual Dinner-Dance of the North of Scotland Division, B.V.A. (in aid of the Victoria Veterinary Benevolent Fund), in the Northern Hotel, Aberdeen, 7.30 p.m.

Jan. 27th.—Special Meeting of the Hert sand Beds Division, B.V.A., at 70, Holywell Hill, St. Albans, 7.30 p.m.

Jan. 28th.—Annual General Meeting of the Yorkshire Division, B.V.A., in the Hotel Metropole, Leeds, 2.30 p.m.

Feb. 2nd.—Ordinary General Meeting of the Sussex Division, B.V.A., at the Old Ship Hotel, Brighton, 2.30 p.m.

Feb. 3rd.—General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, Camden Town, N.W.1, 5.30 p.m.

Feb. 4th.—Annual General Meeting of the North of Ireland Division, B.V.A., at the Albany Rooms, 46, Royal Avenue, Belfast, 3.15 p.m.

Feb. 10th.—Annual Ball of the Royal (Dick) School of Veterinary Studies in the Assembly Rooms, George Street, Edinburgh, 8.30 p.m.

Feb. 10th.—Meeting of the Technical Development Committee, B.V.A., at 7, Mansfield Street, Portland Place, W.1, 11 p.m.

Feb. 11th.—Meeting of the Technical Development Committee, 10.30 a.m.

Feb. 16th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at the Zoological Society of London, Regents Park, N.W.1, 5 p.m.

Feb. 25th.—Liverpool University Veterinary Society Annual Ball, in the Students' Union, Brownlow Hill, Liverpool 7, 8 p.m.

Sept. 4th to 10th.—73rd Annual General Meeting and Congress of the British Veterinary Association at Belfast.

ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Berks. Highfield Farm, Crookham Common, Newbury (Jan. 12).

Cumberland. Roe Foot, Sowerby Row, Carlisle (Jan. 10); Gatra Farm, Lamplugh, Workington (Jan. 13).

Derby. Grange Farm, Cowers Lane (Jan. 10); Hill Top Farm, South Normanton (Jan. 12); Bretby Park Farm, Bretby, Burton-on-Trent (Jan. 13).

Kircudbright. Ladyland, Kirkbean, Dumfries (Jan. 13).

Lanark. Wiston Mill Farm, Wiston, Lamington, Biggar (Jan. 13).

Lancs. Charnocks Farm, Back Lane, Charnock Richard, Chorley (Jan. 13).

Notts. Town Farm, Nuthall, Nottingham (Jan. 13).

Yorks. Old Hall Farm, Burstwick, Hull; Tunstall Farm, Nunthorpe, Middlesbrough (Jan. 10); Carlton Grove Farm, Carlton-in-Cleveland, Stokesley, Middlesbrough; Cliffe House Farm, Bradfield, Sheffield (Jan. 11).

Fowl Pest

Cambs. 1 & 3, Schole Road, Willingham (Jan. 10); Greenhouse Farm, Teversham (Jan. 13).

Essex. Bramble Tye, Cranfield Park Road, Wickford; Knights Farm, Little Waltham, Chelmsford (Jan. 12).

Glouces. Highfield, Churchdown, Gloucester (Jan. 12); Barn Farm, Tewkesbury Road, Cheltenham (Jan. 13).

Lincs. Town Farm, Billingborough, Sleaford (Jan. 13).

Norfolk. Busy Bee Farm, Rollesby, Gt. Yarmouth; 2, Wells Hill, Clint Green, Dereham (Jan. 11); The Bungalow, North Tuddenham, East Dereham (Jan. 12).

Notts. Green Farm, Gringley-on-the-Hill, Doncaster (Jan. 12).

Swine Fever

Bucks. Bryants Farm, Gawcott, Buckingham (Jan. 17).

Cardigan. Ochredewi, Llanddewi-Brefi, Tregaron (Jan. 12).

Ches. Cheerbrook Farm, Newcastle Road, Willaston, Nantwich; The Elms Farm, Parkgate Road, Mollington, Chester (Jan. 10).

Denbighs. Honkley Hall, Burton, Rossett, Wrexham (Jan. 10); Plas Gwyn, Llangynhafal, Llanbedr, Ruthin (Jan. 17).

Derby. Haslin House, Hospur Hill, Buxton (Jan. 15).

Essex. Sunny View, Pear Tree Green, Doddinghurst, Brentwood (Jan. 13).

Flints. Ty Draw, Ffrith, Wrexham; 50, Northrop Road, Flint (Jan. 13).

Hereford. The Court, Woolhope, Ledbury (Jan. 10).

Herts. Trotts Hill Farm, Stevenage (Jan. 14).

Kent. Grove Farm, East Peckham, Tonbridge (Jan. 10); Poplar Farm, Water Lane, Harrietsham, Maidstone (Jan. 13).

Lancs. Little Hey Farm, Moss Side, Formby (Jan. 15); Bullion Moss Farm, Whinney Lane, Blackburn (Jan. 17).

Monmouth. St. Julian's Wood Allotments, Newport (Jan. 10).

Oxford. Barn Farm, Tadmorton, Banbury (Jan. 11); Heath Farm, Cottisford, Nr. Bicester (Jan. 17).

Salop. Chipnall Hall Farm, Cheswardine, Market Drayton (Jan. 12).

Staffs. Diglake Farm, Bignall End, Stoke-on-Trent (Jan. 11); Sewage Works Allotments off London Road, Newcastle; Tunstalls, Woodseaves (Jan. 12).

Suffolk. Dairy Farm, Brightwell, Ipswich (Jan. 14).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

SIR JOHN MOORE AND WILLIAM HUNTING

Sir,—In his Presidential Address at Aberdeen Mr. Graham suggested that we should consider the establishment of a Veterinary Research Council, and Professor Bosworth made the same suggestion in his Presidential Address to the Comparative Section of the Royal Society of Medicine. It is interesting to recall that this suggestion had been made by Sir John Moore in 1923 (*Vet. Rec.* N.S. **3,** 242; **4,** 935) before the formation of the Agricultural Research Council. Dr. J. T. Edwards told me, during one of numerous discussions on the history of the veterinary profession, that this suggestion was opposed by Sir John M'Fadyean, who perhaps saw it as a threat to his own dominating position in this field, but the formation of a Veterinary Research Council at that time might have been of great benefit to the profession.

Following a letter from Mr. Hancock (October 9th) you yourself referred to William Hunting. Having made some study of his life and contributions to veterinary literature (*Vet. Rec.* **55,** 349) I should like to support Mr. Hancock's protest against the omission of Hunting's portrait from the front page of THE VETERINARY RECORD: general approval of the other changes should not influence a decision in this matter. *The Journal of Comparative Pathology*, and *The Journal of Pathology and Bacteriology* both maintain this tradition, and in view of Hunting's great ability as an Editor and the fact that the front cover still appears to be in a state of change, we might well consider reverting to an honourable tradition.

Yours faithfully,
JOHN FRANCIS,

Department of Preventive Medicine,
The Veterinary School,
University of Queensland,
Brisbane.

A LEGITIMATE GRIEVANCE

Sir,—I hope the profession does not allow itself to be taken in by such arguments as that put forward by Mr. Taylor in THE RECORD of January 8th, 1955.

The drug firms, who employ veterinary surgeons, to which he refers are advertising medical and veterinary drugs, and in most cases the advertising is directed to the profession and not the lay public.

They are not advertising the services of their veterinary employees as is the case with the animal clinics.

If a veterinary surgeon or practitioner in private practice knowingly permitted another person to advertise on his behalf, he would (or should) soon receive the attentions of the disciplinary committee.

Surely what is sauce for the goose . . .?

With regard to the relatively small number of people who genuinely cannot afford to pay fees, these can obtain, for at the most the price of a stamp, a certificate from the R.S.P.C.A., which will enable them to obtain treatment from a veterinary surgeon at no cost to themselves. It is unfortunate that very few owners of pets know about this scheme.

Last week I heard of a doctor who had his cat spayed by a welfare society. He was very pleased and put 2s. 6d. in the box.

Yours faithfully,
JOHN RHODES,

Hurst Lodge,
London Road,
Waterlooville.

January 17th, 1955.

Sir,—May I add my views to those already published on this subject?

While the demand for free clinics may exist in some areas, it is quite obvious that the genuinely needy form a very small percentage of attenders, and their needs could, in the main, be adequately covered by the long-standing and well-tried voucher scheme, which by its provision for visits, in clients' houses when necessary, protects the aged and infirm, be they client or patient, from harmful journeys in inclement weather.

In my opinion, the rapid increase in popularity of these clinics, which has had an appreciable, if largely temporary, adverse effect on small animal practices, is a reflection of present-day trends of public thought.

The clients of these establishments appear to consist mainly of two groups: those who consider there should be a national health scheme for animals, and think that "free" treatment is theirs by right; and the even larger number who are quite willing and able to pay, but surrounded by high-pressure advertising in every other walk of life consider, mistakenly but quite naturally, that a brightly painted clinic advertising its facilities in large letters, must provide a more efficient service than that hidden behind the modest plate of the local veterinary surgeon, whose location can usually only be found by laborious search through the columns of small print in the local telephone directory.

Admittedly, abuses of the clinic system are rampant, such as the performance of "luxury" operations and scanty or non-existent almoning, but in those clinics established with the consent, and under the supervision of a veterinary surgeon the remedy is obvious, but can Supplementary Veterinary Register practitioners and licensees, unless human nature changes a great deal, be honestly blamed for not turning away up to 75 per cent. of their clients?

Surely the onus lies fairly on the veterinary profession to take advantage of every modern aid to advertise the services offered by the veterinary surgeon, not as an individual, but as the representative of a profession devoted to the art and science of healing animals? The public should be taught through every vehicle of expression the scope and background of veterinary training, and those terms so confusing to the layman, "veterinary surgeon," "veterinary practitioner" and "licensee" should be clearly explained.

Such minor concessions to M.R.C.V.S. in practice, as permission to display names, addresses and surgery hours in such focal points as post offices and the local Press, could, perhaps be granted without loss of professional dignity.

Such measures as these would help to lower the tension existing at present between ourselves and certain animal welfare organisations, and we would be satisfied that members of the public being in full possession of the facts could view the situation in its true perspective.

Yours faithfully,

OLWEN D. JAMES,

13, Australia Road,
Gabalfa,
Cardiff.

January 10th, 1955.

Sir,—In spite of Mr. Taylor's remarks (January 8th), "A Legitimate Grievance" undoubtedly exists, at least about the inefficient or non-existent almoning and the advertising and publicity of the free clinics.

In these days of full employment, surely only pensioners and widows could be regarded as being unable to pay normal fees. Expensive prolonged treatment can be paid for under the R.S.P.C.A./B.V.A. agreement, if this was more widely known by the public, and almoning at the clinics should be tightened up and made compulsory.

If the welfare societies persist in blatant publicity, members should be allowed to join together to make joint statements to their local Press and the Association appoint a Press Officer who could counteract welfare publicity in the national Press, radio and TV, and at the same time promote a campaign to educate the public about the profession's aims, acts and difficulties.

It has been said that the profession is apathetic and disgruntled, and Messrs. Massey and Johnson give some startling facts and figures. Avoidance of "minority elections" in Council could be achieved if the Divisions adopted a postal vote similar to the R.C.V.S., but run by the local secretaries.

As for the R.C.V.S. elections, I, at least, would welcome a short pen picture of each nominee in THE RECORD as well as a short letter by him stating his views on current controversial topics.

Yours faithfully,

ROBERT POTTER,

73, Mortimer Road,
South Shields.

January 9th, 1955.

Sir,—May I make a few comments on the letters of three of your correspondents published in the issue of January 8th?

Mr. Brisco is apparently surprised that veterinary surgeons are not allowed to advertise. I doubt very much if any important percentage of the profession really wants the right to advertise. What many members wish is that the animal welfare societies should *not* be allowed to advertise.

Mr. Taylor expresses a desire to reintroduce a "sense of proportion" into the correspondence. He says that the need for animal clinics "undoubtedly exists" in this country. Does he honestly think that the number of genuinely poor people in this country merits the fantastic number of free clinics? Is there not a lack of "sense of proportion" in this? He speaks of people who can afford an "occasional few shillings" but cannot budget for prolonged treatment. Does he consider that the castration of a male cat, or the spaying of a female of the same species "prolonged treatment"? Of all the people who attend free clinics how many really attend for prolonged treatment? I suspect that the prolongation is frequently due to the lack, in the first place, of competent treatment.

Mr. Taylor also suggests that the "poor" of to-day are not what they previously were. I take it that he means members of the middle class who are feeling the pinch. It has not been my experience that these are the people who attend free clinics—at least in Glasgow. From personal observation and checks carried out under my supervision I can safely assert that 90 per cent. of the people attending free clinics in Glasgow are of the so-called "working class."

Mr. Taylor's comparison with free legal aid will not stand critical comparison. There are no free "legal offices" run by unqualified and other people, supported by charity, for free legal aid. No lawyer is mulcted by the system.

His suggestion that veterinary surgeons employed by manufacturing chemists are in the same category as employees of animal clinics is farcical. The reputable manufacturing chemists are constantly advising the public to "consult your veterinary surgeon."

Mr. Taylor wonders how many private practices have been adversely affected by the "free clinics." I can supply him with details of seven in quite a small area of Scotland.

Mr. Shepherd classifies the people who attend free clinics. I appreciate his denunciation of those who abuse them, but I am not sure that I fully agree with his classification. I think that in my area the genuine poor come to me, or go to a colleague after a short experience of "clinics." They explain their position and I do not, nor I think do any of my colleagues, turn them away. I agree with the second group, but think that very few wealthy people try to get anything for nothing.

At the end of the year 1954 the daily Press was full of reports of the prosperous state of Britain as

a whole. More people employed than ever before, higher wages than ever before, higher standard of living than ever before. Is it not strange—and disgusting—that there are more free animal clinics than ever before?

Yours faithfully,

M. WATSON,

11, Annfield Place,
Glasgow, E.1.

January 19th, 1955.

EQUINE RADIOGRAPHY

Sir,—Further to my letter as published in your issue of January 8th, and the reply made by Messrs. Dyce, Drury and Merlen, may I say that except for the limbs most of the radiographs to which I referred were of the live animal under intravenous chloral anaesthesia. Messrs. Ilford Ltd. were good enough to allow their technical staff to render me every assistance.

Yours faithfully,

V. BERWYN JONES,

Frocester Lodge,
Nr. Stonehouse, Glos.

THE PRODUCTION OF "GREEN YOLKS" AND OF GROWTH POTENTIATION IN CHICKS BY SODIUM COPPER CHLOROPHYLLIN

Sir,—In the course of an earlier study of "green yolks," one of us was able to reproduce the condition in the eggs of Brown Leghorn hens by administering a chlorophyll preparation ($650\ \mu$ $\frac{E1\%}{1}$-Ω-10) at the rate of 500 mg. daily for 17 days and upwards, and to secure preliminary evidence that a chlorophyll derivative was responsible in naturally-occurring cases (Davies 1951). We have recently had the opportunity of employing chlorophyll derivatives of higher purity and of a greater degree of definition, and have therefore repeated the feeding experiments and extended the identification procedures applied to affected yolks.

At daily dosage levels ranging from 250 to 1,000 mg. of the water-soluble derivative, sodium copper chlorophyllin 100 per cent., green yolks have been produced in from four to 10 days in six of eight Light Sussex hens in their second year of lay. In the remaining two birds, "green yolks" did not appear after dosing at the 250 mg. level for 14 days, but were produced after a further four days when the level was raised to 500 mg. In all instances there was a slow return of yolk colour to normal on cessation of dosing, there being discoloration for up to 14 days subsequently. The appearance of affected yolks was indistinguishable from that of intense naturally-occurring cases. Spectophotometric examination of the solutions obtained from extracted "green yolks" revealed peaks at 405 and 630 μ. The calculated recovery of chlorophyllin from individual yolks was of the order of 1 mg. at the higher dosage levels. These results suggest that chlorophyllin, unless it makes its way to the yolk by the unlikely route of ascending the oviduct, is absorbed from the alimentary tract and transported to the ovary.

Dosage with an oil-soluble coppered complex containing about 15 per cent. of copper phaeophytin failed to exert any significant effect upon yolk colour, even when continued at the 1,000 mg. level for 21 days.

In an extension of the above work, it was also found that sodium copper chlorophyllin 100 per cent. appears to be capable of potentiating growth in the chick. A series of trials by means of a technique similar to that of Gerard *et al.* (1953) has failed to reveal any consistent significant effect up to six weeks of age similar to that obtainable in suitable circumstances from antibiotics. In trials conducted with Light Sussex cockerels up to 12 weeks of age, however, the incorporation of 0.1 per cent. of sodium copper chlorophyllin 100 per cent. in the diet has produced a highly significant potentiation of growth ($P. = 0.01$).

These results will be reported in detail elsewhere.

Yours faithfully,

ALISTAIR N. WORDEN,
J. BUNYAN,
ALAN W. DAVIES,

Cromwell House,
Huntingdon.

January 8th, 1955.

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DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th December, 1954		22	—	—	40	—	51
Corresponding period in	1953	20	—	4	64	—	75
	1952	86	—	—	173	—	40
	1951	20	—	28	32	3	45
1st January to 15th December, 1954		325	4	12	757	—	1,387
Corresponding period in	1953	589	—	39	926	—	2,653
	1952	1,137	—	495	403	1	828
	1951	387	—	98	816	11	1,302